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32T Protection Design and Operation

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The 32T Magnet system, under development at the NHMFL, is a large all superconducting user magnet that is comprised of a 15 T LTS outsert magnet, made by Oxford Instruments, and a 17 T REBCO inner magnet, made by the NHMFL. With the high critical temperature and low quench velocity of REBCO conductors, even at fields as high as 32 T, a large amount of thermal energy must be quickly deposited in the HTS insert magnet in order to properly protect it. In order to distribute enough energy to prevent strain or thermal damage, a series of protection heaters have been integrated to the coil and are powered by a large bank of lead acid batteries and a redundant array of switches. Fault detection is performed by two independent systems that are each capable of activating the protection heaters and triggering the outsert protection system. Details on the detection scheme, hardware, circuits, levels of redundancy, and the performance of the system are presented.

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